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COMMENTS – CLASS II WASTEWATER INJECTION WELL PROJECT AND UNDERGROUND INJECTION AQUIFER EXEMPTION - ADJACENT TO SOUTH BELRIDGE OIL FIELD, KERN COUNTY

In correspondence dated 23 January 2009, the California Division of Oil, Gas, and Geothermal Resources (CDOGGR) requested comments within 30 calendar days from Central Valley Regional Water Quality Control Board (Central Valley Water Board) staff concerning a proposed wastewater injection disposal project and concurrent aquifer exemption request in an area adjacent to and east of the South Belridge Oil Field in Kern County. In correspondence dated 9 February 2009, Central Valley Water Board staff requested 30 additional days to provide comments, which the CDOGGR extended to 24 March 2009.

Background Information

The project applicant, Aera Energy LLC (Aera), proposes to install up to 30 Class II injection disposal wells capable of injecting a combined maximum of 150,000 barrels per day of saline oilfield production wastewater. The proposed injection zone extends from a stratigraphic interval within the Tulare Formation designated by the CDOGGR and Aera, as the Mid Pay Above A (Mid PAA) to the base of the Tulare Formation, a subsurface interval ranging approximately 800 feet to 1,500 feet below ground surface (bgs). As shown in the attached Figure 1, the proposed project area extends laterally within Township 28 South, Range 21 East, Kern County, Sections 7 (NE¼), 8, 9, 14, 15, 16, 17, 20 (NE¼), 21 (N½), 22, 23, 26, 27 (E½), and 35 (N½).

Based on water quality, the United States Environmental Protection Agency (USEPA) considers groundwater in the Tulare Formation to the east of the South Belridge Oil Field capable of serving as an underground source of drinking water. However, the proposed exemption zone does not currently serve as a source of drinking water and will not in the future since the concentration of total dissolved solids within the zone is more than 3,000 milligrams per liter (mg/L) and less than 10,000 mg/L and it is not reasonably expected to supply a public water system.

Because the project area is outside the oilfield boundary, the CDOGGR issued a Notice of Intent (NOI) requesting comments concerning a proposal to revise the CDOGGR Underground Injection Control Program for Class II wells. The proposed revision would exempt the aquifer designation by the USEPA for an injection zone extending vertically from the Mid PAA to the base of the Tulare Formation and laterally within a designated area (Figure 1) to the east of the South Belridge Oil Field. The USEPA and CDOGGR have determined the zone within the designated area meets the criteria for aquifer exemption pursuant to 40 Code of Federal Regulations Section 146.4.

Groundwater in the Tulare Formation to the east of South Belridge Oil Field has existing and potential beneficial uses designated in the *Water Quality Control Plan for the Tulare Lake Basin Second Edition* (Basin Plan). Designated beneficial uses include municipal and domestic supply, agricultural supply, and industrial service supply.

On 4 February 2009, Central Valley Water Board and CDOGGR staff met to discuss the project and the aquifer exemption request. The CDOGGR provided a geophysical log from Aera's well 333KR-20. The top of the Mid PAA in well 333KR-20 is at a depth of about 816 feet or about 350 feet below the top of the Tulare Formation.

Staff Comments

Central Valley Water Board staff is concerned the proposed volume of wastewater injection in the Mid PAA interval of the Tulare Formation in the project area and subsequent lateral flow eastward (downgradient) could potentially impact the existing and potential beneficial uses of the groundwater aquifer in the upper Tulare Formation in the San Joaquin Valley.

Central Valley Water Board staff has the following comments:

1) The project and aquifer exemption request do not appear to be statutorily or categorically exempt from the California Environmental Quality Act (CEQA) and could have a significant effect on the environment. Therefore, the CDOGGR as the lead permitting agency should consider an Initial Study that discusses the mitigation of potential impacts on groundwater aquifers having potential and existing beneficial uses.

2) During a telephone conversation on 4 March 2009, it was stated that the electrical resistivity log for well 416R-26 has a resistivity reading of 7 ohm-meters in the Mid PAA at a depth of 820 feet bgs, and a calculated total dissolved solids (TDS) concentration of 4,835 mg/L. The draft CDOGGR project approval letter states that Aera must collect a fluid sample in the Mid PAA from a well within the project or aquifer exemption area before injection can commence, and that injection will not be approved if the sample exhibits a TDS less than 4,800 mg/L.

   It appears the minimum TDS concentration of 4,800 mg/L for approval to inject wastewater in the Mid PAA was determined from the TDS calculated for the Mid PAA in only the one well. Aera needs to consider the TDS of the Mid PAA calculated from available geophysical logs from additional wells in the project and exemption request areas.

   Central Valley Water Board staff requests copies of available geophysical logs from well 416R-26 and other wells in the project and exemption areas. Other wells include, but may not be limited to, 413E-13, 418J-13, 458A-23, 454R-23, 455E-9, "Jacobs" 57, and 45-22.

3) Aera needs to submit detailed geologic/stratigraphic mapping that demonstrates that the thickness and extent of the upper confining clay above the Mid PAA is present throughout the project/exemption areas. The demonstration needs to confirm that it will perform as a confining layer and be protective of aquifers in the overlying upper Tulare Formation (i.e., Aquifer II). Data from Aera's monitoring well 24P3, located 0.25 miles east of the aquifer exemption area boundary, indicates that Aquifer II has a TDS concentration ranging between 2,600 and 3,000 mg/L. Central Valley Water Board staff has no information regarding the base of Aquifer II.

4) Aera needs to submit a cross section from the South Belridge Oil Field, through the project and exemption areas, continuing east to at least the Buena Vista Slough. The cross section should correlate the stratigraphic intervals evident on the geophysical log from well 333KR-20. Aera's monitoring well 24P3 and Starr and Starr Cotton Growers (SSCG) monitoring well MW-3 should be included in the cross section because they monitor groundwater in Aquifer II. SSCG's agricultural supply well WW-9 should be projected into the cross section because it was drilled to a depth of 721 feet bgs or about 450 feet into the Tulare Formation.

5) The permit should require that prior to injection, Aera propose and install monitoring wells to measure pressure in the injection zone(s) within the exemption area. Fluid samples need to be collected as each well boring is advanced through the Mid PAA and analyzed for the same chemical constituents previously reported for the produced water. A geophysical log needs to be run in each well boring. The monitoring of injection zone pressure needs to begin before injection disposal starts in the project area in order to obtain baseline pressure data. Aera should also collect fluid samples from the Mid PAA during re-abandonment of the "Jacobs" 57 and 45-22 wells.

6) The permit should require that Aera submit to the Central Valley Water Board staff the results of modeling: (a) to initially estimate the time for the injection front to reach the exemption area boundary, and (b) to annually determine, using the pressure monitoring data, the location of the injection front within the exemption area.

   Aera injects wastewater in 29 disposal wells in South Belridge Oil Field within about 0.75 mile of the project area. The injection wells are permitted for wastewater disposal in the Mid PAA and deeper zones. Combining the potential effect of injection from these existing disposal wells with the additional injection proposed in the project area needs to be considered when modeling the extent of lateral flow with time in the exemption area.

Our comments need to be addressed in a revised project approval letter from the CDOGGR. We request 30 days to review the revised project approval letter and submit comments to the CDOGGR.

If Central Valley Water Board staff determines the revised project is not protective of the existing and potential beneficial uses of groundwater in the upper Tulare Formation, then additional conditions or revisions to the project may need to be considered, including permitting wastewater injection into deeper zone(s).

If you have any questions, please contact Douglas Wachtell at dwachtell@waterboards.ca.gov or (559) 445-5114.

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